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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/254,119	04/16/1999	KOHEI TATSUMI	52433/545	6495
26646	7590	04/07/2004	EXAMINER	
KENYON & KENYON ONE BROADWAY NEW YORK, NY 10004			CHAMBLISS, ALONZO	
			ART UNIT	PAPER NUMBER
			2827	

DATE MAILED: 04/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/254,119

Applicant(s)

TATSUMI ET AL.

Examiner

Alonzo Chambliss

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-6, 16 and 17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-6, 16 and 17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 1/15/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The amendment filed on 1/15/04 has been fully considered and made of record.

Response to Arguments

2. Applicant's arguments filed 1/15/04 have been fully considered but they are not persuasive.

Applicant alleges that the 112 1st paragraph rejection should be withdrawn since the specification states “ a flux is **preferably used** for adhesive bonding the solder ball to the electrode ”. Furthermore, one skilled in the art as to the preferred practice of the present invention is clear and unambiguous. Thus, the “ phrase the metal balls are **only** adhesive bonded to the electrodes with a flux. This is deemed unpersuasive because the phrase **preferably used** doesn't mean **only**. Thus, the specification does not state that the flux cannot be used with something else or exclusive be itself.

Therefore, the 112 1st paragraph rejection is maintained.

Applicant alleges that Matsumoto, Okuaki, and Greer all fail to disclose a metal ball being adhesive bonded to and contacted with the electrode. This is deemed unpersuasive because Matsumoto discloses metal balls 6 adhesive bonded to and contacted (i.e. by way of the flux material) with the electrode (see English abstract and all figures).

In regards to the metal balls bonded to the electrodes with a flux without reflowing. Matsumoto discloses metal balls 6 bonded to the electrodes with a flux

without (i.e. prior to) reflowing (see English abstract). Therefore, this rejection is made **final**.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claim 16 and 17, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto (JP 06-333930) in view of Okuaki (JP 63-117450) and Greer (US 5,470,787).

With respect to Claims 16 and 17, Matsumoto discloses a wafer 1 comprising electrodes (i.e. pad) formed on a wafer 1, and bumps 6 each consisting of a spherically formed metal ball having a given size and adhesive bonded to and contacted (i.e. by

way of the flux material) with the electrode (see English abstract and all figures). The electrodes are for the attachment of the bumps 6. The metal balls of bump 6 are only adhesive bonded to the electrodes with a flux 7 without (i.e. prior to) reflowing (see English abstract and all figures). It is well known in the semiconductor industry that a wafer when cut forms unit semiconductor devices to form individual semiconductor chips as evident by Okuaki (JP 63-117450)(see English abstract and all figures).

Therefore, Matsumoto discloses a semiconductor chip with an electrode attached to a metal ball by a flux, since a wafer when cut forms unit semiconductor devices to form individual semiconductor chips. Matsumoto does not explicitly disclose wherein each electrode includes a layer of an electrode material and at least one layer laminated to the layer of the electrode material to avoid deterioration of bonding such that the at least one layer has peripheral dimensions substantially the same as or larger than those of the electrode. However, Greer discloses wherein each electrode 22, 36, 38 includes a layer of an electrode material 36 and at least one layer 38 laminated to the layer of the electrode material 36 to avoid deterioration of bonding such that the at least one layer 38 has peripheral dimensions substantially the same as that of the electrode 22, 36, 38. The at least one layer 38 has a thickness which is smaller than that of the electrode material 22 (see col. 4 lines 49-65 and col. 5 lines 11-50; Figs. 2, 5, and 6). Therefore, it would have been obvious to incorporate the electrode including a layer of electrode material and at least one layer laminated to the electrode material with the product of Matsumoto, since the combination of the layer of electrode material and at least one

layer laminated to the electrode material would provide a stable electrical connection between the chip and the substrate as taught by Greer.

5. Claim 3-6, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto (JP 06-333930), Okuaki (JP 63-117450), and Greer (US 5,470,787) as applied to claims 16 above, and further in view of Yasunaga et al. (U.S. 5,656,863).

With respect to Claim 3, Matsumoto, Okuaki, and Greer all fail to disclose wherein the electrodes are formed from an electrode material of Cu. However, Yasunaga discloses wherein the electrodes 4 are formed from an electrode material of Al (see col. 16 lines 55-58). Therefore, it would have been obvious to one skilled in the art at the time of the invention to substitute a Al electrodes for the electrodes of Matsumoto, Okuaki, and Greer, since the Al electrode facilitates electrical connection path between the chip and an external device as taught by Yasunaga.

With respect to Claims 4 and 5, Yasunaga wherein the electrodes 4 each comprise a layer of an electrode material composed of Al and at least one metal layer made of Cu is laminated to the electrode material layer (see col. 16 lines 55-65), which Cu inherently has a melting point higher than the electrode material made of Al .

With respect to Claim 6, Yasunaga discloses wherein the at least one layer laminated to the electrode material and contacted with the electrode material layer is formed from Cu, wherein the at least one layer 8 (i.e. Sn) farthest from the electrode material layer is contacted with a low melting point metal ball by layer 9 (see col. 17 lines 1-12; Fig. 3).

The prior art made of record and not relied upon is cited primarily to show the product of the instant invention.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956

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A handwritten signature in black ink, appearing to read "Alonzo Chambliss". The signature is fluid and cursive, with the first name "Alonzo" and last name "Chambliss" clearly distinguishable.

Alonzo Chambliss
Primary Patent Examiner
Art Unit 2827

AC/April 5, 2004